

## COMMENTARY

Anna Vittoria Mattioli, MD<sup>ID</sup>, Susanna Sciomer, MD,  
Silvia Maffei, MD, and Sabina Gallina, MD

# Lifestyle and Stress Management in Women During COVID-19 Pandemic: Impact on Cardiovascular Risk Burden



**Abstract:** *CoV-19/SARS-CoV-2 (coronavirus 2019/severe acute respiratory syndrome coronavirus 2) is a virus that has caused a pandemic with high numbers of deaths worldwide. To contain the diffusion of infection, several governments have enforced restrictions on outdoor activities on the population. Today, we are witnessing the so-called “second wave” COVID-19 (coronavirus disease 2019) with an increasing number of cases similar to the one reported at the beginning of the current year. It is plausible that further restrictions will be applied to contain the “second wave” of infections. The present commentary evaluated the effects of stress on lifestyle during the COVID-19 pandemic in women. We briefly suggest practical recommendations for women to reduce stress and recovery for a healthy lifestyle after quarantine. Quarantine is associated with stress and depression, which lead to unhealthy lifestyle, including unhealthy diet, smoking, alcohol, and reduced physical activity. Women are more likely to suffer from depression and stress and quarantine has acted*

*as a trigger. The prolongation of the COVID-19 pandemic around the world requires decisive action to correct the unhealthy lifestyle that has developed in recent months.*

**Keywords:** women; prevention; quarantine; COVID-19; stress; lifestyle; second wave

Organization defined the COVID-19 (coronavirus disease 2019) infection as pandemic.<sup>1</sup> Several governments imposed quarantine and isolation, 2 measures that can prevent the impact of infectious disease outbreaks.<sup>2,3</sup>

Several studies showed that the loss of freedom, uncertainty over disease status, and fear could affect women's health

 Quarantine was associated with an unhealthy lifestyle mainly with regard to nutrition and physical activity. Women in particular suffered from quarantine, reporting weight gain and increased depression, stress, and insomnia. 

**A**t the beginning of this year 2020 a new viral (CoV-19/SARS-CoV-2 [coronavirus 2019/severe acute respiratory syndrome coronavirus 2]) epidemic developed across the world. On March 12, 2020, the World Health

status.<sup>4,5</sup> Quarantine was associated with an unhealthy lifestyle mainly with regard to nutrition and physical activity. Women in particular suffered from quarantine, reporting weight gain and increased depression, stress, and insomnia.<sup>4,5</sup> These

DOI: 10.1177/1559827620981014. From Surgical, Medical and Dental Department of Morphological Sciences related to Transplant, Oncology and Regenerative Medicine, University of Modena and Reggio Emilia, Modena, Italy (AVM); Department of Cardiovascular, Respiratory, Nephrological, Anesthesiological and Geriatric Sciences, Sapienza University, Roma, Italy (SS); Cardiovascular and Gynaecological Endocrinology Unit, Fondazione G. Monasterio CNR-Regione Toscana, Pisa, Italy (SM); and Department of Neuroscience, Imaging and Clinical Sciences, University of Chieti-Pescara, Chieti, Italy (SG). Address correspondence to Anna Vittoria Mattioli, Surgical, Medical and Dental Department of Morphological Sciences related to Transplant, Oncology and Regenerative Medicine, University of Modena and Reggio Emilia, Via del pozzo, 71, Modena 41100, Italy; e-mail: annavittoria.mattioli@unimore.it.

For reprints and permissions queries, please visit SAGE's Web site at [www.sagepub.com/journals-permissions](http://www.sagepub.com/journals-permissions).

Copyright © 2020 The Author(s)

negative effects could persist long after the quarantine ends given the continuing level of attention toward COVID-19 around the world. Today, we are witnessing the so-called “second wave” COVID-19 with an increase in the number of cases.

During the first part of the year the pandemic wave, which lasted over 3 months, exerted massive impacts on health (physical, emotional, and psychological), economies, and sociocultural patterns. These multidimensional effects are visible at local, national, and global levels. Social life is entirely disturbed: people are nearing their breaking points, standing on the verge of violating the constant isolation and quarantine. Health care systems, even in high-income countries, are overwhelmed, and the physical, emotional, and psychological health of people has been noticeably affected. The main question is if we are prepared for the second wave.<sup>6</sup>

The present commentary briefly analyzes the effects of COVID-19 outbreak on cardiovascular risk burden and suggests some recommendations for the prevention of cardiovascular disease in women, especially in anticipation of the second wave and the negative psychological effects it could have on subjects already strongly tested by the first wave.

The majority of Western health care systems developed around the concept of patient-centered care, but during the pandemic there was a change from patient-centered to community-centered care.<sup>5,7</sup> This contributes to aggravating stress and anxiety in women who have concerns about their own health. Quarantine and isolations induce anxiety and stress and the development of symptoms, that is, emotional disturbance, insomnia, depression, stress, low mood, and irritability.<sup>7</sup> Moreover, people are afraid of stigma. The powerful influence of the media combined with the relative impotence of those stigmatized can result in the associative stigma extending to an entire country, or city perceived at high risk of COVID-19 disease. COVID-19 has already generated numerous rumors and

conspiracy theories that increase anxiety in people.

The World Health Organization terms this flow of (mis)information as “infodemics,” stating, “We’re not just fighting an epidemic; we’re fighting an infodemic.”<sup>8</sup> This (dis)information is propagating parallel to the escalation of COVID-19, due to social media, such as Facebook, Twitter, and Instagram, that amplify the circulation of (dis) information.<sup>9</sup>

Women are found to have suffered greater distress during the COVID-19 pandemic.<sup>10,11</sup> The use of antidepressant drugs was increased during the outbreak. The monthly report from Express Scripts, a benefits management program for US-based pharmacies, reported that in March 2020, the prescription of antianxiety medications increased by 34% within a month, while the prescriptions for antidepressants they increased by 18% and three quarters were new prescriptions.<sup>12,13</sup>

Stress has been recognized as a risk factor for cardiovascular disease mainly in women. Stress and depression are associated with inflammation and depression of the immune system, factors that are involved in both COVID-19 and cardiovascular disease.<sup>14,15</sup>

Recently, it has been suggested that self-guided therapy derived interventions are recommended to improve well-being during isolation.<sup>16</sup>

Other activity-based interventions comprised a broad category including various physical exercise, arts, and music-based activities.<sup>16</sup>

Several evidences have also demonstrated that physical activity can be effective in ameliorating the mental well-being and having the potential to prevent symptoms of mental health disorder such as depression and anxiety.<sup>17</sup>

A study from Maugeri and coworkers<sup>17</sup> found that in Italy, during the pandemic, the physical activity levels significantly decreased and that the male group showed highly significant variation between before and during COVID-19 emergency as compared to the female group. Previous works have largely

described gender differences in exercise habits and motivations for exercise.<sup>18,19</sup>

Practical recommendations for reducing stress after lockdown are the following: resume contact with family and friends; engage in relaxing activities; ask for psychological support in the case of persisting signs of anger and stress.

The main consequence of stress related to quarantine is a change in lifestyle; women adopted an unhealthy diet and reported reduced physical activity. Lifestyle is the sum of behaviors driven by multiple interconnected environmental factors and their consequences. Lifestyle includes the interaction of inadequate nutrition due to excessive ingestion of unhealthy food, the growing consumption of cigarettes and alcohol, the lack of physics activity, increasing stress, psychological disorders, and poor sleep.

Unhealthy diet is rich in energy-dense foods and poor in fresh fruit and vegetables. COVID-19 is characterized by an inflammation status and by the “cytokine storm” that mainly affected patients with metabolic syndrome, diabetes, and obesity and strongly influenced the response to therapy.<sup>20-22</sup>

Furthermore, therapeutic protocols are evolving in response to the pathophysiological responses that occur in patients with COVID-19 and which are being identified day by day. The vast majority of articles exploring risk factors related to prognosis and disease risk have found obesity and metabolic syndrome to be contributing factors.<sup>20-22</sup> During the quarantine induced by the first epidemic outbreak, it was observed that women were more likely to develop food cravings where psychological, emotional, and behavioral aspects led to introducing sugar- and fat-rich foods.<sup>5,22-25</sup> The result was an increase in obesity, which mainly affected postmenopausal women. After menopause, due to changes in metabolism, obesity becomes one of the most important cardiovascular risk factors for women. Obesity is associated with chronic inflammation leading to atherosclerosis and endothelial dysfunction. Moreover, obesity seems to increase the risk of

serious complications of COVID-19.<sup>16,22</sup> Looking at the second wave of COVID-19, it is essential to take action to prevent unhealthy habits, that is, supporting the recovery of a healthy diet rich in antioxidants, increasing the intake of fresh seasonal fruit and vegetables, reducing the intake of foods rich in sugars and fat, and increase outside physical activity. During quarantine governments prohibited outdoor exercise and social activities (eg, going to the gym) resulting in a reduction of physical activity. Regular physical activity helps maintain normal weight and reduce obesity.<sup>5,14</sup>

Women are less likely to perform physical activity and the gap increases after menopause.<sup>25,26</sup> However, regular exercise helps in maintaining weight after the menopause, has a strong effect on bones, and prevents the reduction of skeletal muscles.<sup>5,14</sup> During the post-quarantine summer period, several activities were resumed; however, further restrictions were imposed due to the spread of the “second wave.”<sup>27</sup>

Technology can help, since many smartphones provide step-count, which monitors physical activity. Moreover, in order to control their diet and maintain their personal ideal weight, many people use mobile applications related to nutrition. The increasing number of health and nutrition applications available on Google Play and the Apple App Store are proof of the collective awareness regarding the adoption of a healthy lifestyle. App programs may be more effective when social support is advocated and could prove to be a useful instrument in recovering from the impact of quarantine on lifestyle.<sup>28</sup>

To date, several gyms have developed customized physical activity programs for their members and connect with them via teleconferencing or web group meetings.

In conclusion, we need to be prepared to fight the increase in cardiovascular risk burden following the pandemic. After quarantine we need to reevaluate the cardiovascular risk in women, assess biometrical and metabolic parameters, and promote healthy lifestyle.<sup>10</sup>

Considering the multifaceted nature of healthy lifestyle, applying transdiagnostic approaches can contribute to achieving better results. Global action in support of interventions to improve quality of life must be multidimensional and use physical, psychosocial, and emotional aspects to encourage people to return to a healthy life. This action needs to be stronger for women that will suffer to a higher degree from the inevitable restrictions and economic crisis following COVID-19 pandemic.

## Acknowledgments

We would like to thank Mrs Janet Ann Carter for editing the article. We thank everyone who is working to resolve the SARS-CoV-2 pandemic.

## Author Contributions

AVM and SS conceived the idea of the article. AVM, SG, SM, and SS developed the different parts of the manuscript, and performed the final supervision. All authors contributed to and approved the final manuscript.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Ethical Approval

Not applicable, because this article does not contain any studies with human or animal subjects.

## Informed Consent

Not applicable, because this article does not contain any studies with human or animal subjects.

## Trial Registration

Not applicable, because this article does not contain any clinical trials.

## ORCID iD

Anna Vittoria Mattioli  <https://orcid.org/0000-0003-1487-9530> 

## References

1. World Health Organization. WHO announces COVID-19 outbreak a pandemic. Accessed November 27, 2020. <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>
2. Parmet WE, Sinha MS. Covid-19—the law and limits of quarantine. *N Engl J Med*. 2020;382:e28. doi:10.1056/NEJMp2004211
3. Mattioli AV, Ballerini Puviani M. Lifestyle at time of COVID-19: how could quarantine affect cardiovascular risk. *Am J Lifestyle Med*. 2020;14:240-242. doi:10.1177/1559827620918808
4. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*. 2020;395:912-920. doi:10.1016/S0140-6736(20)30460-8
5. Mattioli AV, Sciomer S, Cocchi C, Maffei S, Gallina S. Quarantine during COVID-19 outbreak: changes in diet and physical activity increase the risk of cardiovascular disease. *Nutr Metab Cardiovasc Dis*. 2020;30:1409-1417. doi:10.1016/j.numecd.2020.05.020
6. Ali I. COVID-19: are we ready for the second wave? *Disaster Med Public Health Prep*. Published online May 7 2020. doi:10.1017/dmp.2020.149
7. Louvardi M, Pelekasis P, Chrousos G, Darviri C. Mental health in chronic disease patients during the COVID-19 quarantine in Greece. *Palliat Support Care*. 2020;18:394-399. doi:10.1017/S1478951520000528
8. World Health Organization. Novel coronavirus (2019-nCoV)—situation report 13. Accessed November 27, 2020. <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf>
9. Zarocostas J. How to fight an infodemic. *Lancet*. 2020;395:676.
10. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Yifeng X. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatry*. 2020;33:e100213.
11. Gómez-Salgado J, Andrés-Villas M, Domínguez-Salas S, Díaz-Milánés D, Ruiz-Frutos C. Related health factors of psychological distress during the COVID-19 pandemic in Spain. *Int J Environ Res Public Health*. 2020;17:3947.
12. Express Scripts. America's state of mind report. Accessed November 27, 2020. <https://www.express-scripts.com/corporate/americas-state-of-mind-report>

13. Pizzi C, Rutjes AW, Costa GM, Fontana F, Mezzetti A, Manzoli L. Meta-analysis of selective serotonin reuptake inhibitors in patients with depression and coronary heart disease. *Am J Cardiol.* 2011;107:972-979. doi:10.1016/j.amjcard.2010.11.017
14. Mattioli AV, Sciomer S, Moscucci F, et al. Cardiovascular prevention in women: a narrative review from the Italian Society of Cardiology working groups on "Cardiovascular Prevention, Hypertension and Peripheral Circulation" and on "Women Disease." *J Cardiovasc Med (Hagerstown).* 2019;20:575-583. doi:10.2459/JCM.0000000000000831
15. Oren O, Gersh BJ, Blumenthal RS. Anticipating and curtailing the cardiometabolic toxicity of social isolation and emotional stress in the time of COVID-19. *Am Heart J.* 2020;226:1-3. doi:10.1016/j.ahj.2020.04.015
16. Fischer R, Bortolini T, Karl JA, et al. Rapid review and meta-meta-analysis of self-guided interventions to address anxiety, depression, and stress during COVID-19 social distancing. *Front Psychol.* 2020;11:563876. doi:10.3389/fpsyg.2020.563876
17. Maugeri G, Castrogiovanni P, Battaglia G, et al. The impact of physical activity on psychological health during Covid-19 pandemic in Italy. *Heliyon.* 2020;6:e04315. doi:10.1016/j.heliyon.2020.e04315
18. Nasi M, D'Alisera R, Cossarizza A, et al. Sex difference in access to sports: a 1-year retrospective study. *Am J Lifestyle Med.* In press.
19. Davis JC, Cowles M. Body image and exercise: a study of relationships and comparisons between physically active men and women sex. *Roles.* 1991;25:33-40. doi:10.1007/BF00289315
20. Marfella R, Paolisso P, Sardu C, et al. Negative impact of hyperglycaemia on tocilizumab therapy in Covid-19 patients. *Diabetes Metab.* 2020;46:403-405. doi:10.1016/j.diabet.2020.05.005
21. Paolisso P, Bergamaschi L, D'Angelo EC, et al. Preliminary experience with low molecular weight heparin strategy in COVID-19 patients. *Front Pharmacol.* 2020;11:1124. doi:10.3389/fphar.2020.01124
22. Mattioli AV, Pinti M, Farinetti A, Nasi M. Obesity risk during collective quarantine for the COVID-19 epidemic. *Obes Med.* 2020;20:100263. doi:10.1016/j.obmed.2020.100263
23. Rodríguez-Martín BC, Meule A. Food craving: new contributions on its assessment, moderators, and consequences. *Front Psychol.* 2015;6:21. doi:10.3389/fpsyg.2015.00021
24. Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. *Nutrition.* 2007;23:887-894. doi:10.1016/j.nut.2007.08.008
25. Mattioli AV, Ballerini Puviani M, Nasi M, Farinetti A. COVID-19 pandemic: the effects of quarantine on cardiovascular risk. *Eur J Clin Nutr.* 2020;74:852-855. doi:10.1038/s41430-020-0646-z
26. Sciomer S, Moscucci F, Maffei S, Gallina S, Mattioli AV. Prevention of cardiovascular risk factors in women: the lifestyle paradox and stereotypes we need to defeat. *Eur J Prev Cardiol.* 2019;26:609-610. doi:10.1177/2047487318810560
27. Ricci F, Izzicupo P, Moscucci F, et al. Recommendations for physical inactivity and sedentary behavior during the coronavirus disease (COVID-19) pandemic. *Front Public Health.* 2020;8:199. doi:10.3389/fpubh.2020.00199
28. Mattioli AV, Nasi M, Cocchi C, Farinetti A. COVID 19 outbreak: impact of the quarantine-induced stress on cardiovascular disease risk burden. *Future Cardiol.* Published online April 30, 2020. doi:10.2217/fca-2020-0055